

CLAIMS

WE CLAIM AS OUR INVENTION:

1. A method for welding objects having limited backside access to a cavity
5 behind a region to be welded, the method comprising:
 inserting a fugitive backing material in an installation state into a first portion of
the cavity proximate the region to be welded;
 transforming the fugitive backing material to a rigid state;
 forming a weld in the region; and
10 transforming the fugitive backing material to a removable state and removing the
fugitive backing material from the cavity.
2. The method of claim 1, wherein transforming the fugitive backing material to a
rigid state comprises compacting the fugitive backing material.
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3. The method of claim 1, wherein transforming the fugitive backing material to a
rigid state comprises curing the fugitive backing material.
4. The method of claim 1, wherein transforming the fugitive backing material to a
20 rigid state comprises hardening the fugitive backing material.
5. The method of claim 1, wherein transforming the fugitive backing material to a
rigid state comprises allowing gravity to hold the fugitive backing material in a desired
position.
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6. The method of claim 1, further comprising preventing the fugitive backing
material from extending into the region to be welded while inserting the fugitive backing
material into the cavity.
- 30 7. The method of claim 1, further comprising preventing the fugitive backing
material from extending into the region to be welded while transforming the fugitive
backing material to a rigid state.

8. The method of claim 1, wherein the fugitive backing material comprises a fusible material.

5 9. The method of claim 8, wherein the fusible material comprises one of the group consisting of a metal powder and a brazing compound.

10. The method of claim 1, wherein the fugitive backing material comprises a refractory material.

10 11. The method of claim 10, wherein the refractory material comprises one of the group consisting of silica, quartz, and alumina.

12. The method of claim 1, further comprising:

15 mixing particles of the fugitive backing material with a binder to form a paste;
inserting the paste in the cavity; and
allowing the paste to harden.

13. The method of claim 12, wherein the binder comprises one of the group
20 consisting of sodium silicate and hydrolyzed ethyl silicate.

14. The method of claim 1, further comprising installing a pre-formed weld
backing in the cavity directly adjacent the region to be welded prior to inserting the
fugitive backing material.

25 15. The method of claim 14, wherein the pre-formed weld backing comprises an
weld facing surface comprising a shape complementary to a desired weld root shape.

16. The method of claim 1, further comprising filling a second portion of the
30 cavity with a second fugitive backing material.

17. The method of claim 1, further comprising transforming the fugitive backing material to a comparatively more viscous state after inserting it into the cavity.

18. The method of claim 1, further comprising transforming the fugitive backing material to a comparatively less viscous state after welding.

19. The method of claim 18, further comprising removing the fugitive backing material from the cavity after transforming it into a comparatively less viscous state.

20. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of chemical leaching.

21. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of melting.

22. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of sublimation.

23. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of dissolving.

24. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of releasing a force compacting the fugitive backing material.

25. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of flushing the fugitive backing material out of the cavity.

26. The method of claim 1, wherein transforming the fugitive backing material to a removable state comprises a process of allowing gravity to act on the fugitive backing material.

27. A method for welding objects having limited backside access to a cavity behind a region to be welded, the method comprising:

placing a pre-formed weld backing in the cavity directly adjacent the region to be
5 welded;

at least partially filling a portion of the cavity with a fugitive backing material to provide support for the pre-formed backing;

forming a weld in the region;

transforming the fugitive backing material to a removable state and removing the
10 fugitive backing material from the cavity; and

removing the pre-formed weld backing from the cavity.

28. The method of claim 27, further comprising transforming the fugitive backing material to a rigid state by one of the group consisting of compacting, curing, hardening,
15 and allowing gravity to hold the fugitive backing material in a desired position after at least partially filling the portion of the cavity with the fugitive backing material.

29. The method of claim 27, wherein the fugitive backing material is one of the group consisting of a metal powder, alumina, silica, quartz, and wax.
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30. The method of claim 27, wherein the fugitive backing material is removed by a process of dissolving.

31. The method of claim 27, wherein the fugitive backing material is removed by
25 a process of:

heating the fugitive backing material to a melting temperature; and

allowing the fugitive backing material to flow from an opening in the cavity.

32. The method of claim 27, wherein the fugitive backing material is removed by
30 a process of sublimation.

33. The method of claim 27, wherein the fugitive backing material is removed by liquefying the fugitive backing material.